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ABSTRACT

Science fairs have the potential to help students develop new ways of solving problems using a scientific approach. This supplemental guide was developed for those teachers involved with science fairs as well as others who work with students in developing a project. Several reasons for holding a science fair are listed, along with some considerations on when to hold a science fair. The advantages and disadvantages of voluntary fairs versus mandatory fairs (where all students must participate) are discussed. The types of projects are categorized as either experimental or demonstration, and the pros and cons of each are listed. Other sections of the booklet deal with: (1) how to introduce the science fair project to the student; (2) organization of the science fair project (including a student flow chart); (3) basic information about projects utilizing an experimental design; (4) suggestions for using library resources to develop the written portion of the project; (5) tips on effective oral and visual presentations; and (6) guidelines for judging science fairs. The appendix contains sample materials from several fairs including letters to parents, judge's packets, and an extensive listing of ideas for projects. (TW)

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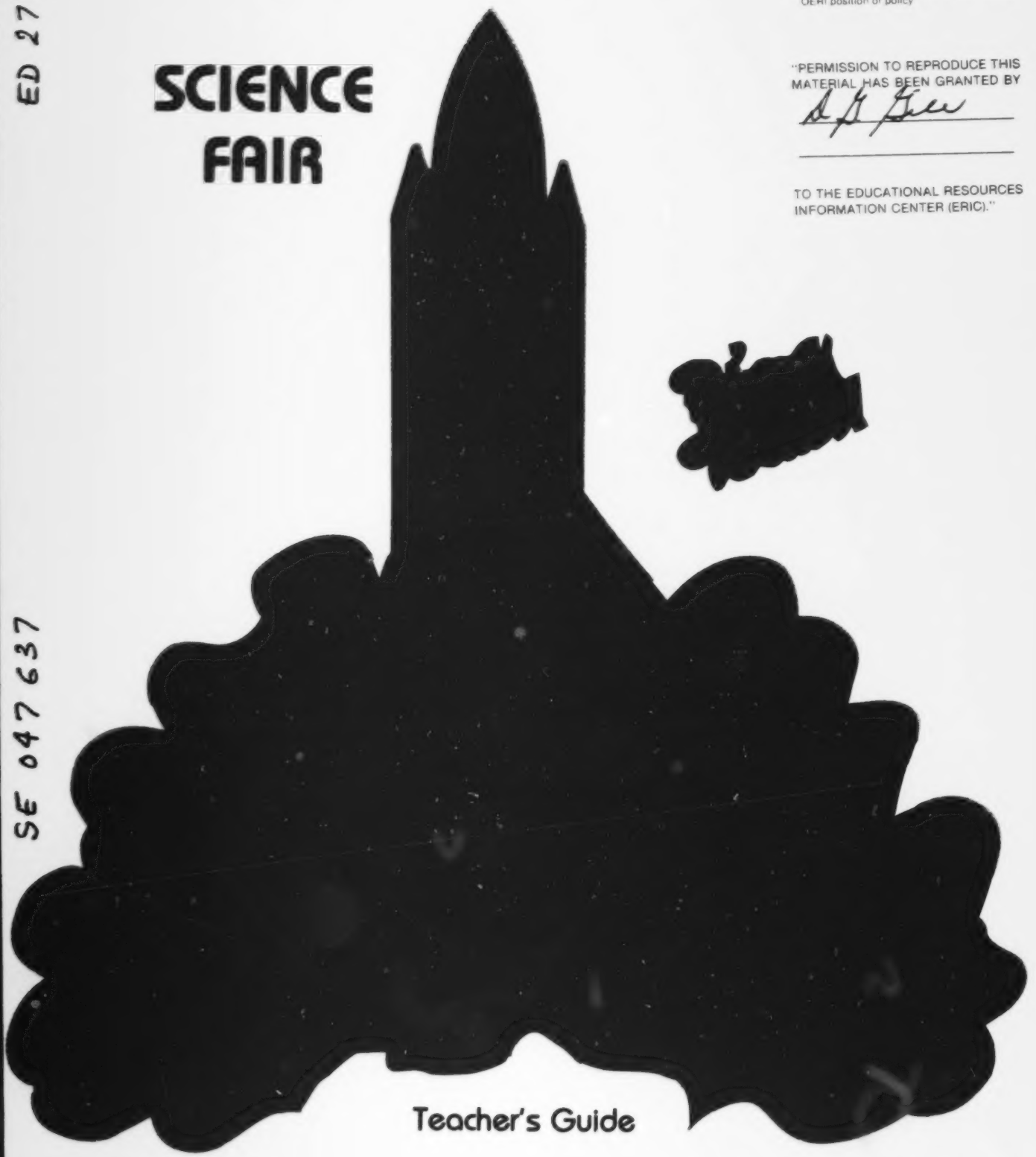
SCIENCE FAIR



Teacher's Guide

TEACHER'S GUIDE FOR

SCIENCE FAIR
IT'S A BLAST!

A Guide for Junior High Students

Sponsored and funded by:

Regional Superintendent of Schools
Lake County, Illinois

Illinois State Board of Education

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INTRODUCTION

This supplement is intended as a guide for persons involved with science fairs as well as those who work with students in developing a project. The guide may be helpful to those who are experiencing problems with their science fair program.

The guide does not attempt to answer all questions but draws attention to typical problem areas which have presented themselves in the past. It is suggested that the teacher/parent choose what works for him/her.

Much information in this guide is based on criteria established by the Illinois Junior Academy of Science (IJAS). For more information regarding the Academy, write Project Planning & Development, Illinois State Board of Education, 100 N. First Street, Springfield, IL 62777.

Information included in the Appendix is a sampling of materials that has been used by various schools. It may be used as a model in planning your own fair.

The student handbook begins by giving the purpose of a science fair:

> By using your interest in science, no matter how small, the science fair will help you develop new ways to solve problems by using the scientific approach.

Remember, this purpose has been phrased specifically for youngsters.

RATIONALES FOR SCIENCE FAIR PROJECTS

Following is a list of rationales that educators might use as a basis for supporting science fairs. A science fair provides students an opportunity to:

*use the scientific method to investigate an idea.
*follow through on a commitment.
*improve and develop written, oral and organizational skills.
*nurture an interest in science.
*develop special talents and abilities.
*improve research and library skills.
*gain insight into the problems and methods of thinking that are peculiar to scientists yet applicable to other occupations.
*find that his/her project provides another avenue for communicating with parents.
*become involved in verifiable experimentation.
*share the experience of analyzing findings and drawing conclusions.
*become involved with an activity that contributes to the building and strengthening of self-image.

WHEN TO HOLD YOUR SCIENCE FAIR

The decision when to hold a science fair depends on many things: when your school facilities are available, when you can obtain maximum participation of students, parents, faculty members and judges, etc. For example, if the size of your fair requires the use of the school gym, you may wish to schedule the judging and display of projects during the evening or on Saturday. However, keep in mind that holding a science fair during out-of-school hours may mean that fewer students participate. If your fair will be voluntary, try to schedule it when there will be a minimum of conflicting activities.

If you choose to participate in the Illinois Junior Academy of Science exhibition, your local fair will need to be completed by the end of February. Regional competitions are generally held in late March or early April. The state fair is usually held in early May.

TYPES OF FAIRS

	Advantages	Disadvantages
VOLUNTARY		
	Few parental complaints.	Teachers must promote the fair.
	Teachers tend to work only with those students who want to be in the fair.	There is a risk of lack of student involvement.
	Teachers work with a smaller number of students.	A possible lack of administrative and other teacher support.
	Students tend to be very positive about the fair.	A possible lack of parent involvement.
	Fewer management problems due to smaller number of students.	
MANDATORY		
	All students are involved.	Too many students involved.
	All students have their expectations about the fair pre-set.	The possibility of too much parent involvement.
	The low self-imaged student has a chance to be involved.	Complaints from parents.
	May encourage students to deepen their involvement in science.	Teacher time per student may be limited.
	May generate more peer interaction.	Large numbers can cause management problems including judging space, class time, inadequate supervision, etc.

TYPES OF PROJECTS

Advantages	Disadvantages
EXPERIMENTAL	
IJAS guidelines can be followed.	Harder for students to do.
Fosters scientific method and thinking.	Harder to grade and judge.
Fosters other educational skills.	Intermediate grade student may have more difficulty.
May be more applicable to upper-level and upper-ability students.	
Only type allowed at IJAS science exhibitions.	
DEMONSTRATION	
May be more successful for lower-ability students.	Tends to be too easy.
May be more applicable to lower-level and lower-ability students.	Less chance of expanding knowledge and skills.
	Cannot be involved in IJAS science exhibitions.

INTRODUCTION OF THE SCIENCE FAIR PROJECT TO THE STUDENTS

1. Explain the experimental method and define such terms as hypothesis, variable, experiment, control, conclusion, observation, demonstration, results, review of literature, etc.

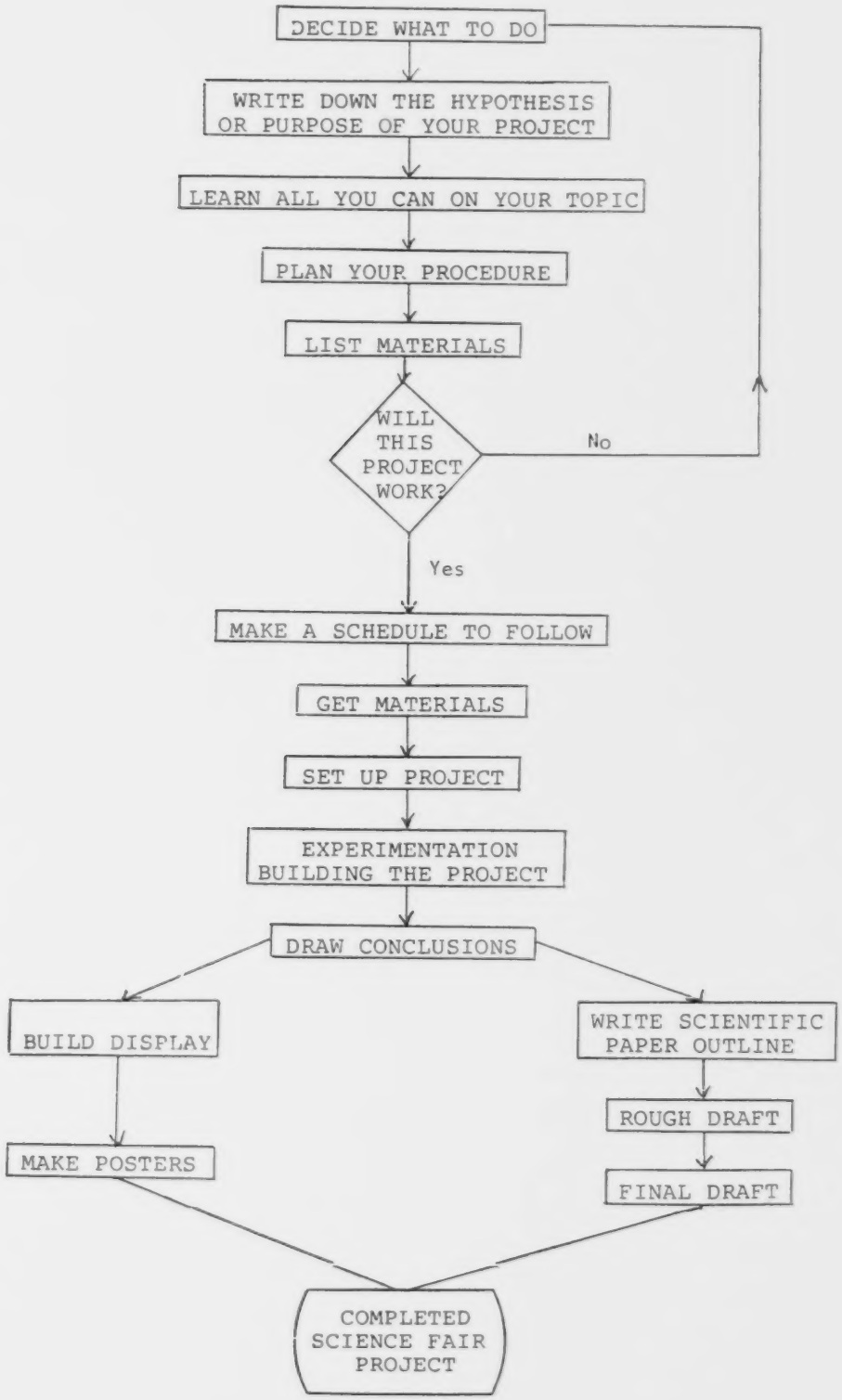
2. Sources of ideas for the students might include slides or photos of previous projects, displays of old projects, filmstrips, IJAS yearbooks, teacher resource books, science magazines, media and old science books.

3. Common practice shows that students can work well individually. However, in some cases, groups of two are acceptable.

4. Students may need help in organizing their time. Such help may include a personal time-table for project completion. The flow chart that follows attempts to break down the activities of project preparation and sequence their order. This flow chart might have applications for teacher planning as well as student planning.

5. Student work may occur at any time during the year. Encourage a child to improve his previous project.

FLOW CHART FOR DOING A SCIENCE FAIR PROJECT



IJAS DIVISION TOPICS

Following is a list of the fifteen categories of the Illinois Junior Academy of Science. Full descriptions can be found on pp.1-2 of the 1984 IJAS Guide Book and Policy Manual. For a list of suggested topics, see the Appendix, p.23.

Aero-Space Sciences (Astronomy, Aeronautics, etc.)
Behavioral Sciences (Psychology, Animal Behavior, etc.)
Biochemistry
Botany
Chemistry
Computer Programming
Conservation
Earth Sciences (Geology, Geography and Meteorology)
Electronics
Engineering Sciences
Health Sciences
Mathematics
Microbiology
Physics
Zoology

THINGS A TEACHER SHOULD MAKE SURE THE STUDENT UNDERSTANDS FOR EXPERIMENTAL DESIGN

A project should include controlled experimentation. A controlled experiment is when you regulate all factors that could possible influence or change the outcome of the experiment, leaving only one thing to be tested: the variable. Consider the following example:

A. Project: The Effect of A Fertilizer on Plant Growth.

The student should list all those factors that need to be controlled because they might influence experimental results. These factors are: light, moisture, temperature, depth of seed planting, type of seeds, soil types, and humidity. The variable (the thing being tested) would then be fertilizer.

B. Once the variable is established, a controlled experiment can be set up. It will consist of two identical experiments conducted at the same time, differing in one variable. The two similar experimental set-ups will be called:

1. Control group - that part of the experiment to be used as a standard of comparison.
2. Experimental group - that part of the experiment where the variable is being tested.

C. The results of these two groups can be compared. The variable is the only differing factor. Therefore, the difference in results of the two groups will be due to the variable.

Helpful Hints:

1. Does each experiment have:
   a) a control group and an experimental group?
   b) only one variable used?
   c) as large a sample size as the student needs to obtain valid results?
   d) all the equipment the project needs?

2. This would be the time when dependent and independent variables can be introduced and used.

3. Remember to keep the experiment within the student's ability; make sure too many variables are not used; and keep the topic specific.

SUGGESTIONS FOR LIBRARY RESOURCE SKILLS

*Instruct the students in how to take notes, using notecards or a spiral notebook.
*Encyclopedias are a good starting point for information but should not be used as the sole resource. A minimum of 5-6 different sources is recommended.
*Make sure the student does not gather unnecessary information.
*Depending on the ability of the students, primary and secondary sources can be explained.
*Start a vertical file in the classroom or in the library with the help of the librarian.
*Correlate language arts and science by having the L.A. teacher be involved in the students' writing of scientific papers.

OBSERVATIONAL SKILLS

1. Encourage the students to take accurate and complete notes, keeping all data together in a spiral notebook or binder. Students should:
   *Keep notes about everything. It's better to record too much data than not to record enough.
   *List their materials and the quantities they used.
   *Record the day and times of all observations.
   *List the cost of material (if desired).
   *Organize data so that if they check back later it will still be meaningful to them.

2. Taking photographs is often a good way to collect data.

3. Charts and graphs are an easy way to present data. If necessary, correlate the accuracy and appropriateness of charts and graphs with the math department.

DRAWING CONCLUSIONS

The conclusion is the verification of the hypothesis and an answer to the problem based upon interpretation of the data. The conclusion should be consistent with and supported by the student's data.

*Remind the students that unexpected results may be just as important as what they had expected.
*There are no wrong results--only unexpected ones.
*Don't let the student abandon negative results. Let them benefit from them.
*Don't let students get discouraged. They should repeat their procedures until they have reproducible results.

Limit discussion of the conclusion to the specific problem posed at the start of the project. For example, a student should not say that "grass needs light in order to grow," if he worked with only one type of grass. This answer could be justified only if many types of grass had been grown.

THE PAPER

*The suggested minimum length for a review of literature is 2-3 pages.
*Although handwritten papers may be acceptable at local fairs, the IJAS requires a typed paper. (It is permissible for an outsider to type the student's paper.)
*An abstract may help the student to organize his/her report in a concise form.
*The IJAS requires an Abstract, Safety Sheet, and Vertebrate Animal Endorsement. These forms may not be needed at local fairs but they can be used. (See the Appendices of the 1984 IJAS Guide Book.)

There is often confusion with usage of "affect" and "effect." The following definitions and examples may be helpful:

AFFECT is almost always used as a verb in general vocabulary.
It means to produce an effect on, influence, to put on a pretense.
Examples: Caffeine affects the body.
He was deeply affected by his father's death.
The disease had been affecting her mind for years.

EFFECT is most commonly used as a noun. It means something produced, the result.
Examples: Overwork had an effect on his health.
The effect of smoking on the lungs is being studied.

EXCEPTION. Effect can be used as a verb to mean to produce as an effect, to bring about, accomplish.
Example: The change to computers was effected last spring.

Identification trick: If "the" or "an" appears before the word, it is a noun and the word should be "effect."

In a bibliography, all sources are alphabetized in one list by author, or by the first significant word in the title (where no author's name is given). One standard format for listing a source is:

Author. Title. Place; publisher, date, page(s).

Check a current Reference or Style Manual to provide your students with the bibliography format that is acceptable in your school.

VISUAL PRESENTATION

1. In setting up their display, students may encounter the following problems:
   *lacks creativity in arrangement.
   *project display is not neat.
   *project display is unnecessarily cluttered.
   *project display lacks sufficient materials.
   *display has not been arranged to show a logical sequence of events.
   *display or parts of display do not coincide with project.

2. If your students participate in an IJAS science exhibition, projects must conform to IJAS rules. Exhibits must not exceed dimensions of 76 cm. front to back, 122 cm. from side to side, and 122 cm. from table to top. These dimensions provide for an easy and workable display. (Local fairs may permit displays of different dimensions.)

3. A self-supporting display, which is not too heavy or too flimsy, makes set-up and breakdown much easier.

4. The display could be constructed of poster board, railroad board, tag board, corrugated cardboard, plywood, paneling, or pegboard.

5. A sketch of the display should precede its actual construction.

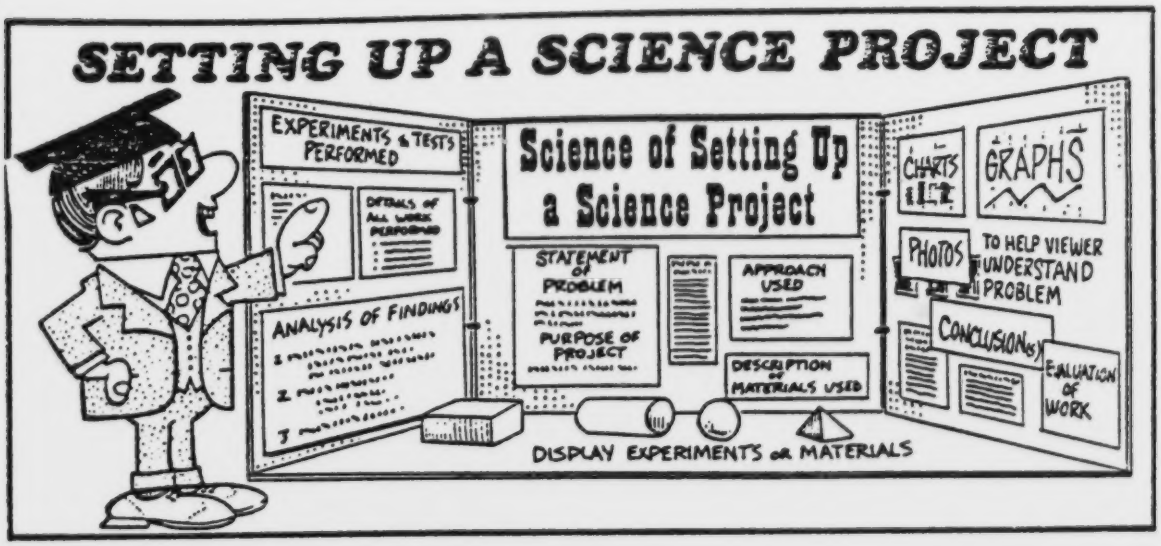
6. Lettering should be clear and legible. It's best to use stencils, dry transfer, tracing, or pre-cut letters.

7. Graphs, charts, photos and drawings add to the attractiveness of the display.

8. Use attractive, attention-getting colors.

9. Parents can be helpful in the design and construction of the display, but there may be a tendency for parents to become too much involved.

10. Nuts and Bolts is a good reference for display design and construction.



ORAL PRESENTATION

The following problems commonly occur:

*Presentation is too brief.
*Presentation is too lengthy.
*Presentation diverts from the project.
*Presentation fails to show depth of research.
*Presentation lacks continuity.
*Student does not show enthusiasm.
*Student displays annoying mannerisms during the presentation.
*Student does not make adequate use of the display.

Your Language Arts teacher may wish to work with the students in developing their speeches.

TIPS ON SETTING UP YOUR FAIR

*Provide adequate electrical outlets for projects needing electricity.
*Place first those projects needing electricity.
*Avoid taking tables from classrooms. Sources for tables may be churches, resource centers, fairgrounds, or students can provide their own (card tables work well).
*Plan sufficient set-up time before judging.
*Provide a printed list of projects and exhibitors.

AWARDS

It is good motivation to provide some type of award to students for their accomplishments. This can be done in the form of ribbons and/or certificates. Special awards could be arranged through the local parent/teacher organization, Exchange Club, V.F.W., or other community organization. Special awards might be given for the Best of Fair, Best Experimental Project, Best Demonstration Project, or best topical project (such as Environmental Studies).

FOLLOW UP IDEAS

*Send a list of project titles, student names and awards to local newspapers and local cable companies.

*Send thank-you letters to judges and others who helped with the fair.

*Write out a list of concerns which you could work on for the next fair.

*Develop a file of project photos and copies of student reports for future reference.

*Start preparation for regional and state fairs.

HOW TO SELECT JUDGES

Obtaining qualified judges is a major responsibility of the science fair coordinator. The most competent judges are often people who combine a science background with an understanding of what can reasonably be expected of children at various age levels. Qualified judges may be drawn from the teaching profession (including both active and retired teachers), industry, the medical profession, senior citizen organizations, church and community groups. College students enrolled in advanced science courses are an excellent source of judges for middle school and high school level projects.

The IJAS places high priority on the experimental project as opposed to the model or demonstration. Should you choose to accept student projects which are demonstrations or models, you may wish to revise the criteria suggested by the IJAS (see Appendix, p. 27).

It is suggested that enough judges be obtained to allow each project to be judged twice or by a team of two judges, with no team judging more than 5-6 projects. Judges should be informed by letter of their responsibilities, including the amount of time that will be required of them. Include a map or written directions to your school and a copy of the judging sheet to be used. Allow enough time to meet with the judges before they begin in order to clarify their responsibilities and answer any questions they may have. Of course, a follow-up letter is always appropriate to thank the judges for their participation and to encourage their future support.

SPECIAL NOTE TO THE TEACHER

Without a sense of humor, you will never make it to the end of the fair. Remember these simple laws to help you keep smiling.

Murphy's Laws for Science Fairs

1. If difficulties do appear in a science fair project, they will appear at the worst possible time.
2. Once a "bug" in a science fair project has been detected, it will go from bad to worse.
3. The more obvious the problem, the more obscure the cause and cure.
4. If anything whatsoever can go wrong with any part of a science fair project, it will.
5. The combined forces of nature will always aid the hidden flaw.
6. The most difficult problems will always seem the simplest during planning stages.

(From an anonymous Cape Canaveral missileman, quoted in Ideas for Science Fair Projects.)

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APPENDIX
SOURCE: Viking JHS

APPENDIX

Dear Parents:

It is again time to start thinking about our annual Science Fair. The staff and students at Viking will be working very hard to make it a success. We appreciate the help and encouragement you can give your children. In order to keep you informed, we include a schedule of due dates. Thank you for your help and cooperation.

Schedule of Science Fair Due Dates

Date	Material Due
November 20	Tentative Experiment Hypothesis.
November 24	Bibliography Cards (list of books and magazines to be read for Survey of Literature).
December 14	Survey of Literature note cards.
January 10	Rough Draft of Survey of Literature.
January 14	Last date to change experiment hypothesis, materials list, or procedure.
January 24	Rough Draft of Experiment (includes incomplete graphs, charts and tables).
February 11	Final Copy of Complete Paper (includes both Survey of Literature and experiment write up).
February 16	Display and paper set up in gyn during school.
February 17	Science Fair Judging in the gym (parents excluded). Parent Visitation: 7:00-9:00 p.m. Remove displays after 8:00 p.m.

Students who earn an "Outstanding" or "First Place" award in the Viking Science Fair are eligible to enter the Northeastern Illinois Regional Science Fair at Wheeling High School in mid-March. Revision and additional experimentation may be required of those students who choose to enter the regional fair. Winners of the Regional Science Fair are eligible to enter the Illinois State Science Fair at Champaign in May.

Science grading will be slightly modified during the time in which students prepare for the Viking School Science Fair. Because students do work so hard and do much of the preparation in school, we are increasing the amount of credit given to students for their Science Fair work. Science Fair preparation will be averaged with other daily work, tests, and preparation, but will not exceed approximately 25% of the student's science grade.

Sincerely,

Science Teachers at Viking JHS

pcr

APPENDIX
SOURCE: Wilmot JHS

Dear Parents:

Your child has expressed an interest in a project using live vertebrate animals. Such projects done by students are generally discouraged because of the difficulties of insuring humane treatment of the animals. However, if your child's interest persists, such work is then encouraged. It is recognized that experimentation with animals can be an outstanding learning experience. Far more significant than the science content learned in such studies is the excellent opportunity to reinforce our respect for living things as well as underscoring the meaning of humane treatment.

The intent of this letter is an attempt to insure that you and your child understand the special responsibilities that such a project requires. Therefore, please read the discuss with your child the information on the attached sheet. Your signature on the form at the bottom of this letter will let your child's science teacher know that you are aware of the project your young scientist is embarking upon.

Thank you for your cooperation.

Sincerely,

Science Department
Wilmot Junior High School

* *

DETACH AND RETURN THIS PROTION TO CHILD'S SCIENCE TEACHER

I have read the above letter and the information sheet on the "Study of Living Things" and exhibition requirements. I have discussed with my child the responsibilities involved in such a project. I understand the nature of what my child is seeking to do.

_____ _____

Date Parent's Signature

APPENDIX
SOURCE: Wilmot JHS

STUDY LIVING THINGS

Living things are marvelous! The National Science Teachers Association encourages you to study them. Consider studying plants, non-harmful bacteria, fungi, protozoa, worms, snails, insects and other invertebrates, farm animals, zoo animals, wild animals, domestic pets, and yourself!

Do observe animals in the wild. Study normal functions: *communication *learning processes *activity cycles *reproduction *genetics *special senses *growth *metabolism *behavior *nerve reflexes *interrelationships of organisms.

If you have live animals in the classroom, are you ready for the responsibilities?
*constant qualified supervision
*comfortable, clean, spacious living quarters
*clean drinking water at all times
*balanced diets
*care on weekends and during vacations
*plans for the organism after you are finished

THINK OF IT THIS WAY: DO TO ANIMALS ONLY THOSE THINGS YOU WOULD WANT DONE TO YOU!

Don't cause pain or distress to mammals, birds, fish, amphibia and reptiles. Therefore, do not expose them to:
*surgery
*alcohol
*harmful drugs or chemicals
*ionizing radiation
*cancer-producing agents
*electric shock
*extreme temperatures
*deficient diets
*toxic fumes
*overcrowded living quarters
*excessive exercise
*punishment

Excerpted from
SCIENCE AND CHILDREN, September 1980

PROCEDURES FOR THE PREPARATION OF A PROJECT USING LIVE ANIMALS

1. The student completes the endorsement form, including plans for housing the animal and how vacation periods are to be handled.
2. The teacher approves the form.
3. The letter is sent home plus the endorsement form.
4. The signed portion is returned.
5. The consultant is approached and signature secured. This is done by the student. We can sign the form as a consultant if we really do feel qualified.
6. The experimentation should begin.

APPENDIX
SOURCE: Wilmot JHS

GENERAL INFORMATION ABOUT THE SCIENCE FAIR

How Do I Enter?

Complete the entry form available from your science teacher.

Can I Do the Project With a Friend?

Science teachers like to see students working alone, but, yes, you may enter with a friend.

What Happens If My Project Wins?

Certificates will be given all participants in the Science Fair. These certificates will show the rating of the project as determined by the judges. Three special awards will also be given. First, the Principal's Trophy is awarded the best, first-place experimental project. A second award will recognize the best demonstration project in the fair. The third special award is an environmental award which recognizes the best environmental or ecological project.

The Science Department will select first place projects to participate in the Regional Fair of the Illinois Junior Academy of Science (IJAS). Projects at the Regional Fair that receive an Outstanding or a high First Place are eligible to be entered in the State Science Exhibition at the University of Illinois in Champaign in May.

How Will My Project Be Judged?

The judges will determine how much you know about your project and will judge on the work put into the project. A boy or girl who knows the "why" and the "how" of his/her project has a distinct edge over a contestant who has a beautiful model or display but does not understand it or know much about it.

Judges will be looking for:
1. Evidence that you understand what your project can or cannot do and what it explains or does not explain.
2. How experimental it is.
3. Your knowledge of basic scientific principles.
4. Your knowledge of known facts and specific principles that apply to the project.
5. General neatness in the project and in your appearance.
6. How much work you did.
7. How many and how well various resources were used.
8. A scientific paper.

What Equipment Do I Need?

You must provide your own card table. The table must be a safe support for your exhibit. You should provide adequate protection for the table tops if necessary (some plastic cover if water or other liquids are to be used, etc.). Each table is to be labeled on the underside with the name and address of the participant and entry number of the exhibit. These numbers will be assigned later

for the purpose of locating each exhibit according to plans. If you need electricity, you must provide one extension cord.

If you intend to participate in the regional and state fairs, your exhibit should not exceed the dimensions recommended by the IJAS (76cm deep by 122cm wide and 122cm high).

What Should I Put Into the Project?

A. It is suggested that each exhibit include at least one poster giving the title of the project and explaining briefly what it does or what it is supposed to show. Posters must stand up by themselves. Be sure your poster or display has large, neat looking lettering. Neatness and originality will help make your project more easily understood and more attention getting. Your poster(s) should be self-supporting. Nothing can be hung on the walls! Your posters can be made to stand up by themselves in a number of ways: reinforcing the back with a flap, connecting three posters to form a three-sided box, etc. You need not bring a chair; it will be supplied for you.

B. All projects are to include a 4" x 5" placard giving:
   1. Name of project.
   2. Name of contestant.
   3. Grade.

C. All projects must include a brief paper. This paper is to follow the pattern given in the information sheet entitled "Project Paper."

What Safety Precautions Do I Take?

Dangerous materials (acids, flames, explosives, etc.) should not be displayed. Such a project may be made safe by substituting a safe substance for the dangerous material. Your story may be told just as well with a bottle of water instead of gasoline, for example. Erupting volcanoes are not allowed.

Switches and moveable parts should be sturdy so that they will not break down during demonstration and use. Expensive materials or instruments should be wired down and supervised at all times.

All live animals must have protection of a glass or double screen so that the animals cannot be touched by the spectators.

Projects using electricity must have extension cords and multiple plugs supplied by you. All your wiring should be in good condition. Low voltage equipment is preferable. More elaborate equipment should have proper shielding and protection. In other words, normal safety rules regarding electrical connections, etc., should be observed.

When Should I Start?

NOW!
Give yourself plenty of time to solve problems and to experiment. Don't be afraid to change your project if you are having too many problems.

APPENDIX
SOURCE: Woodland JHS

January, 19xx

Dear Parents:

During the next two months, your junior high student will be participating in a science research project. This project is the first stage for those students with outstanding science projects to be entered in our district science fair in late February.

With supervision from the science teacher, each student is expected to complete a science project as part of the nine-week science grade. Each junior high unit will then select projects that have demonstrated originality, scientific value and the investigation of scientific theory to be entered in our Junior High Science Fair.

Judges will be invited from local industries and schools to help in the selection of outstanding junior high science projects. Those students who receive an outstanding or first place will then be invited to display their work at the Illinois Junior Academy of Science regional fair in Wheeling in early April.

The purpose of the science project is to instill in all students the responsibility of performing and completing a project of their choice. It is not our intention to emphasize the winning of awards, but to develop in each student a feeling of self-satisfaction after completing a project of his/her own.

As a parent, you can play a vital role in the Science Fair. We encourage you to work with your children but we ask that you do not develop the project for them. Instead, encourage them to excel in the project, draw out questions, and provide possible solutions. Most important, give your child encouragement.

Your child's science teacher will be available to provide you with additional information at your request.

Thank you,

Principal
Woodland Junior High School

pcr

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SOURCE: Woodland JHS

JUDGE'S PACKET

Attention Judges:

Attached is a sheet explaining what to look for in grading the Science Projects. Also attached are the actual individual project grading forms. There is one form for every project you are responsible for evaluating. The number in the upper right hand corner should correspond with the project's number on one of the tables. When you reach the project to be graded, check the student name and project title to see if these are correct. If they are not, please correct them. You will also find a couple of sheets of scratch paper attached.

When you are finished grading each one of the projects assigned to you, kindly return all of the sheets to the Judge's Room.

If you have any questions at any time, please stop and ask me for assistance.

Remember, be encouraging. Don't be afraid to ask the students questions after they are finished presenting their project. Any comments regarding the improvement of the project would be appreciated and can be put on the back of the judging form.

Don't forget to SIGN YOUR JUDGING FORM.

Thank you for your help in making this Science Fair a successful one.

Head, Science Department
WOODLAND JR. HIGH SCHOOL

pcr
Attachments

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SOURCE: Woodland JHS

INSTRUCTIONS TO JUDGES

1. In your judging folder you will find a score sheet for each project you are to judge. You may want to take a walk and locate all of your projects.

2. Judge the projects in teams. When you finish a project, place the score sheet in the box located in the Judging Room.

3. Scoring is as follows:

   a. The project's score is based on a total score of 100 points. There are 5 areas under which a project is judged (see the score sheets).
   b. A project receiving a total of 97-100 points is awarded an Outstanding and may represent our school at the Regional Science Fair. Therefore, the project must be experimental and investigative following a scientific approach of a question or a problem.
   c. A project receiving 90-96 is awarded a First Place and may represent our school at the Regional Science Fair also.
   d. A project receiving a point value falling between 80-89 will receive a Second Place.
   e. A project receiving a point value between 70-79 will be awarded a Third Place.
   f. Finally, a project receiving a total point value below 70 will be awarded an Honorable Mention.
   g. Use your judgment when awarding points so that the total score will indicate whether you feel the project is Outstanding, First, Second, Third, or Honorable Mention.

4. All projects should fulfill the requirements listed on the Score Sheet regarding the five areas of concentration:
   a. Scientific Approach.
   b. Written Papers (abstract and paper).
   c. Oral Presentation.
   d. Creativity/Originality.
   e. Neatness and Arrangement.

Suggestions

1. When you are finished, you may need to adjust the total point value so that the project is awarded the place you feel it deserves.

2. You may want to read the paper in the Judge's Room or some other quiet place, if necessary.

3. Bear in mind the age and educational background of the students. Has the student gone far beyond what would be expected of a student of his/her age?

4. As you judge this project, consider the following as characteristics of a complete project:

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SOURCE: Woodland JHS

EVIDENCE OF	VALIDITY OF	PRESENTATION OF
1. Knowledge gained.	1. Information.	1. Written
2. Scientific approach.	2. Conclusions.	a. Paper.
3. Experimental literature researched.		b. Abstract.
4. Individual work.		2. Oral
5. Thoroughness.		3. Visual

5. Please remember that the student did not do this project to get an award only. In most cases, months and even years have been spent in preparation. Please acknowledge this student's interest by helping the student with appropriate comments and suggestions. Be positive and encouraging in your comments. PLEASE do not neglect to write comments.

6. If you feel that for any reason you cannot be objective in your evaluation of a project, you may give it to another judging team or return the judging sheet to the Judge's Room and we will take care of reassigning the project.

7. The project paper is often neglected by judges. Please make an effort to evaluate the paper and abstract. Some judging teams have made a practice of collecting all abstracts and/or papers before beginning judging. Then they sit down over coffee and survey the papers so that they have the general project background before talking to the student. You might want to try a similar approach.

8. Please take some time to stop and talk to students having projects of special interest to you. A special judging sheet will be provided in the Judge's Room so that you may indicate to us your impression of these additional projects. We will use your comments to help us with special awards.

Thank you again,

Science Department Staff
WOODLAND JR. HIGH SCHOOL

pcr

APPENDIX

JUDGE'S SCORE SHEET
(use reverse side for comments)

Exhibitor(s) _____

Grade _____ School _____

Project Title _____

_____ Category _____

QUALIFICATION CRITERIA (check if project FAILS to fulfill criterion)

___ Safety Check.
___ Use and care of animals.
___ Project size.
___ Exhibitor(s) present.
___ Safety Sheet displayed.
___ Vertebrate Animal Endorsement displayed if necessary.
___ Research Paper displayed.
___ Abstract displayed.

EVIDENCE OF (circle score under each category)

1. Knowledge Gained	1	2	3	4	5	6	7	8	9	10
2. Scientific Approach	1	2	3	4	5	6	7	8	9	10
3. Experimental Research	1	2	3	4	5	6	7	8	9	10
4. Individual Work	1	2	3	4	5	6	7	8	9	10
5. Thoroughness	1	2	3	4	5	6	7	8	9	10

VALIDITY OF

1. Information	1	2	3	4	5	6	7	8	9	10
2. Conclusions	1	2	3	4	5	6	7	8	9	10

PRESENTATION

1. Written: a. Research Paper						1	2	3	4	5
b. Abstract						1	2	3	4	5
2. Oral	1	2	3	4	5	6	7	8	9	10
3. Visual	1	2	3	4	5	6	7	8	9	10

TOTAL SCORE _____

___ DISQUALIFIED (give reasons):

_____
Judge's Signature

do not fill in this space

Primary	K-3	___ Outstanding	95-100
Elementary	4-6	___ First	85-94
Junior	7-9	___ Second	70-84
Senior	9-12	___ Third	1-69

APPENDIX

IDEAS FOR SCIENCE FAIR PROJECTS

The following list includes examples of research science projects that have the type of controls and variables that make them ideal science projects.

Effects of different gases on plants.
Respiration in plants and animals.
Bacterial growth curves (as measured by turbidity).
Digestive enzymes.
Photosynthesis (can test many factors that affect photosynthesis, including the effects of light, colored cellophane, amount of starch produced, etc.).
Effects of various chemicals on the growth rate of plants (especially salt which has implications on the retrieval of farmland from the sea).
Regeneration in planaria (or crickets).
Do birds really have a sweet tooth? (An experiment testing whether a bird has a preference for flavored foods.)
Diffusion.
Reactions of various animals to environmental conditions (planarians, daphnia, isopods, crickets, and earthworms).
Effects of various types of soil on plant growth.
Testing Mendel's hypothesis (using mice or hamsters).
Plant deficiencies.
Testing for nutrients.
Seed retardation.
Effects of nicotine on daphnia or other animals.
Which type of wood has the best heat value?
Testing Koch's postulates.
Seed germination (how it is affected by temperature, depth of planting, moisture, and fertilizer).
Factors that affect the growth of mold.
How enzymes work.
Training goldfish.
Effects of drugs on the respiration of goldfish or frogs.
Osmosis or diffusion.
Herbicides.
Do pheremones affect behavior?
Do soaps really kill microbes?
How gibberillic acid affects plant growth or development.
Effects of caffeine and other drugs on plant development.
How to transform metals into products.
How to make batteries.
Comparing various brands of batteries (as to strength, brightness, effects of heat and coldness, etc.).
Effects of acids and other chemicals on road building materials.
Building a homemade steam engine.
Comparing the value of fuels.
How acids affect metals.
Measuring surface tension.
Building a Van de Graff generator.
Which detergent works best?
Which bleach works best?
Comparison of taste location on tongue.
Insulators in the home.

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Flammability of various household materials (rugs, clothing, etc.).
Which floor tile is really best?
How color affects heat absorption.
How heat affects land and water.
Inverse square law as applied to light.
Comparing a homemade camera to a commercial one.
Solar engines.
Testing organic matter for humus.
Porosity of soils.
Mixing colors.
Building and testing a homemade hygrometer.
Which glue bonds best? (Test for strength and how temperature affects bonding.)
Electroplating and electromotive reactions.
How electricity produces magnetism and magnetism produces electricity.
What product is the best stain remover?
Solar distillation.
Distillation of alcohol.
Purifying water or testing it for hardness.
Can paper be recycled?
Specific gravity.
Effects of television watching on grades.
Identifying sexual stereotyping.
Use of wood as a home fuel source.
Attitudes about the use of nuclear energy.
Effects of reading rate on grade point average.
Comparison of Vitamin C on natural and prepared beverages.
Efficiency and accuracy of calculating by hand and by calculator.
The greenhouse effect and car colors.
Attitudes of hunters and non-hunters about hunting.
Directionality in mealworms.
Effects of soap solution on the germination of radish seeds.
Short-term memory across age groups.
Flammability of different carpet types.
Lung capacity as a function of height.
Relation of kids' fear and imagination.
Comparison of popcorns.
Tunneling behavior of meadow voles.
Comparisons of smokers and non-smokers on taste sensitivity.
The concept of a minute across age groups.
Color food preferences of gerbils.
Voltage and amperage comparisons of batteries in high-drain use.
Coin and dice probability.
Aerodynamics of auto styling shapes.
Tasting sensitivity across sex and age groups.
Acidity levels and vinegar eel reproduction.
Reproductive growth of paramecia in light and dark conditions.
Location of coyotes in Randolph County.
Comparison of metrification ability of science and non-science students.
Thickness comparisons of ketsup.
pH comparisons of shampoo (or aspirin, antacid).
Sugar content of food.
Conductivity of various solutions and/or substances.
Comparison of puzzle assembly time.
Comparison of insulations.

Nitrate, phosphate, mercury analysis of water.
Factors affecting fermentation.
Effects of calcium (or junk food) on mice.
Comparison of reaction time, reflexes and concentration.
Blood pressure comparisons versus age, sex, or activity.
Factors affecting bird feeding stations.
Effects of root types on erosion.
Comparison of sugar consumption for sugared and add-your-own cereal.
Per cent of body fat.
Comparing food spoilage systems (Tupperware).
Comparing food spoilage additives.
Comparisons of learning using auditory and visual stimuli.
Comparisons of temperature on cloudless and cloudy nights.
Comparisons of temperature and air pressure at various altitudes.
Effects of working mothers on student behavior.
Comparison of student responses to moral dilemmas.
Comparisons of populations of fur-bearing animals trapped over time.
Derivation of math formula for pi, volume, etc.
Effects of many variables on seed germination.
Comparisons of student shoplifting or littering.
Comparisons of the amount of litter on inbound and outbound sides of a highway.
Weight gain in chicken egg development.
Temperature gradients in aquatic systems.
Use of returnable bottles and recycling.
Web construction of spiders.
Comparison of sedimentation in Kaskaskia River at downstream intervals.
Tunnel building behavior of ants.
Temperature variations in houses of various levels.
Population comparisons of northern and southern facing slopes.
Differences in shadows at various latitudes.
Paper towel comparisons-absorbancy, strength, etc.
Comparison of physical skills by sex.
Comparison of water consumption.
Soluble and insoluble solutions.
Effects of temperature on density.
Comparisons of seed number and distribution in fruits and vegetables.
Water lost by leaky faucets.
Evaporation rates of various liquids and various shapes.
Actual boiling point of water in Red Bud.
Electricity consumption of various appliances.
Body temperatures of pet animals.
Morning height versus evening height.
Wood preference of termites.
Energy, work, distance relationships in 10-speed bicycles.
Mass changes in popped popcorn.
Energy relationships in seed germination.
How does sound affect plant growth?
What per cent of diet is water?
Hair thickness of different colors of hair.
Drop size of different liquids.
Effects of salt on the freezing and boiling points of water.
Mineral content of drinking water.
Color combinations and their perception under different colors of light.
Temperature differences with electric fans.

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Effects of catnip on cats.
Ability to hear high-pitched sounds at different ages.
Effects of biorhythms on behavior.
Effects of order, nonsense words, and repetition on learning.
Effects of age and sex on achievement motivation.
Comparison of math ability by sex.
Comparing heroes and values.
Comparisons of the dexterity of left- and right-handed people.
Effects of caffeine on nerves.
Iron content in hair samples.
Testing margarines for fat.
Effects of radiation on seeds.
Sensitivity of snails to magnetic fields.
Comparison of suspension bridges.
Inheritance in fruit flies.
Tolerance of plants to salt.
Chemistry of leaf color change.
Aerodynamics of kite design.
Effects of electricity on bacteria.
Travel of ground water.
Effects of age, sleep, and exercise on pulse.
Effects of music on strength.
Effects of alcohol on chickens.
Effects of zipcodes on mail delivery.
Shoe design for different sports.
Stress testing of different shapes.
Effects of developer concentration on image formation.
Effects of temperature on the bounce of a tennis ball.
Effects of use on the bounce of a tennis ball.
Effects of temperature on mealworm production.
Effects of egg rotation on chicken development.
ESP in twins and siblings.
Effects of cigarette smoke on plant growth.
Adolescent blood pressure under stress.
Comparison of bicycle brakes.
Erosion from various terrains.
Effects of ultraviolet light on bacteria.
Effects of acid rain on crops.
Effects of fertilizer on earthworms.
Effects of temperature on density.
Effects of sweeteners on small rodents.
Effects of enriched and deprived environments on mammal growth.
Effects of daily petting on mammal growth.
Comparisons of sound preferences of mammals.
Comparison of sex ratio in mammal litters.
Escape and novelty behavior of mammals.
Comparisons of muscle fatigue by sex.
Comparison of sweat gland location.

CRITERIA FOR JUDGING PROJECTS AND SCIENTIFIC PAPERS

The main objective of a student research project is to foster scientific experimentation. To do this, research of scientific literature is only the first step. From this information, a scientific experiment must be set up, data collected, and conclusions drawn. Therefore, a science project is an actual individual EXPERIMENT conducted by the student himself. The following are guidelines for judging and not a strict check list. The decision of the judges is final.

A. EVIDENCE OF:

1. Knowledge Gained
   - A. Is there evidence that the student has acquired scientific skills or knowledge by doing this project?
   - B. Does the exhibitor recognize the scope and limitations of the problem he or she has selected?
2. Scientific Approach
   - A. Has a scientific approach been made to the problem?
   - B. Has the exhibitor solved the problem by using known scientific facts or principles as a basis for new conclusions?
   - C. Is he or she aware of the basic scientific principles which lend support to the methods used and the conclusions made?
3. Experimental Research
   - A. Has data been gathered from work done by the student personally instead of being the result of others?
   - B. Has the student had to devise methods of carrying out work unique to the project, such as designing a special piece of apparatus or deciding on specific materials needed?
   - C. Is the exhibitor's equipment effective? Does it do what it was intended to do?
   - D. Can the research be the basis for further experimentation?
   - E. Is the project actually a model or demonstration? If so, it should receive a "third" rating.
4. Individual Work
   - A. Has material as a whole been gathered from various sources and reorganized according to the student's own thinking in contrast to a report from a single source or something copied directly from a chart or book except in cases of classification and the like where credit must be given to the proper authority?
   - B. Has the student set up a systematic plan of work and secured measurements for his or her data?
   - C. If the student has had assistance, can those portions of the presentation which represent other people's work be identified?
5. Thoroughness
   - A. Is the exhibitor aware of the empirical method--for the necessity of repeating trials and the importance of controlling the variables in experiments in order to reach valid conclusions?
   - B. How orderly has been the analysis of the problem?
   - C. How successful has the original plan been carried through to completion?

B. VALIDITY OF:

1. Information
   - A. Are known facts and principles stated correctly and used accurately?
   - B. Have results of experiments been reported accurately even though faulty

experimental methods or conditions may have made data unreliable? If so, have these errors been noted?

C. Is data complete or at least based on random, rather than selected samplings?

2. Conclusions

A. Has the student started with known facts and drawn his or her own conclusions?

B. Are the conclusions consistent with the data and/or observations?

C. PRESENTATION:

1. Written

A. Research Paper

1. Has the exhibitor searched the literature concerning the project?
2. Has the exhibitor made thorough use of the data, bibliography, interviews and correspondence, etc., and noted them correctly?
3. Considering the age and experience of the exhibitor, does the project make use of his or her abilities?

B. Abstract. Is the abstract present and written in the required IJAS form?

C. Safety Sheet

1. Is the safety sheet present and signed?
2. Was the student aware of hazards?

D. Vertebrate Animal Approval Notice. If vertebrates were used, is the Vertebrate Animal Approval Notice present and signed?

E. Is the paper based on recorded experimental research and/or observation?

2. Oral

A. Is the presentation done in an interesting manner so that others are attracted to it?

B. Has the presentation been well organized and planned?

3. Visual

A. Has data been presented in the most explicit way for the particular type of information involved? Are spelling errors present?

B. Does the exhibit demonstrate general neatness and attractiveness?

D. GENERAL. When rating the project or paper, consider the following:

1. OUTSTANDING. The following criteria may identify an outstanding project.

A. Scientific approach to a specific problem using relevant experimentation.

1. Approach indicates creativity.
2. Conclusions logically deduced from experimental data.
3. Clear, concise research paper containing abstract in required form, safety sheet, and vertebrate endorsement where appropriate.

B. Student can speak knowledgeably on contents of paper and area of investigation.

1. Good quality and quantity of background information evident.
2. Good bibliography.

C. The display (not apparatus but charts, graphs, data, photos, etc.) is a viable medium for scientific expression.

2. FIRST AND SECOND. A lesser degree of the above--e.g. insufficient bibliography, lack of thoroughness in experimental technique, or lack of knowledge of subject area.

3. THIRD. A serious omission or mistake is present--e.g. no proof of experimentation, no scientific approach evident, bibliography very poor or non-existent, information incorrect, no abstract, no safety sheet, or no vertebrate endorsement present in paper. Also any model or demonstration should be rated a third. The judging chairman will supply specific tips and pointers for a given category.

Excerpted from the 1984 Guide Book and Policy Manual of the IJAS, pp. 11-12.

NEED EXTRA COPIES?

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